DAMAGE CHARACTERIZATION ON BUMPER PLATES WHEN SUBJECTED TO HYPERVELOCITY IMPACTS

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Current developments in warhead design have focused in the improvement of lethality of interceptor missiles. The use of rod warheads has reduced the requirements of a direct missile impact by ejecting a cloud of heavy metal projectiles in the trajectory of the incoming missile that can penetrate its skin and destroy its warhead [1]. This paper describes a set of Smooth Particle Hydrodynamics (SPH) simulations of tungsten cylindrical and spherical projectiles impacting on steel bumper plates at different hypervelocity impact configurations. These bumper plates are meant to idealize the internal components of the missile warhead. Comparisons of the destructive capabilities of the spherical and cylindrical projectiles for every impact configuration are presented. Cylindrical geometries were spatially rotated to cover a wide range of impacting configurations. The incidence angle of the velocity vector was also varied. Impact velocities of interest range from 1-3 km/s. A rational approach is proposed to quantify and characterize the level of damage inflicted on each impact event. This rational definition of damage coupled with a statistical analysis of the relevant variables provides a generalized metric that will allow us to provide recommendations to attain a desired level of damage on the idealized warhead.

References

[1] R. Lloyd, "Lethality of Rod Warheads Against Ballistic Missiles," *Raytheon Final Technical Report BR-27007*, 2000.